

Assessment of Tile Drainage Systems in the Jewett Brook Watershed: November 2017 Monitoring Summary



*JBT01 tile drain
monitoring station*

PROJECT NO.

15-309

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November 2017 Monitoring Summary

The purpose of this report is to document monitoring activities performed last month, in November 2017, at 12 selected tile drain outlets in the Jewett Brook watershed in St. Albans, Vermont.

All 12 stations are operational. Table 1 identifies the start dates for monitoring activities at each station. The first set of weekly composite samples was collected and processed on April 11, in accordance with the project Quality Assurance Project Plan, Version 1.0, Amendment 1.

Every 30 minutes, flow and sampling data are transmitted to Stone's server. These data are checked periodically to assess whether the sampling program is working as intended. Figure 1 displays an example of flow data (top panel) at station JBT06, along with the time each sample aliquot was dispensed to the sample carboys (bottom panel). Figure 2 displays flow data from the start of the monitoring period at JBT01. These data are considered representative of the pattern of flow observed across all the stations.

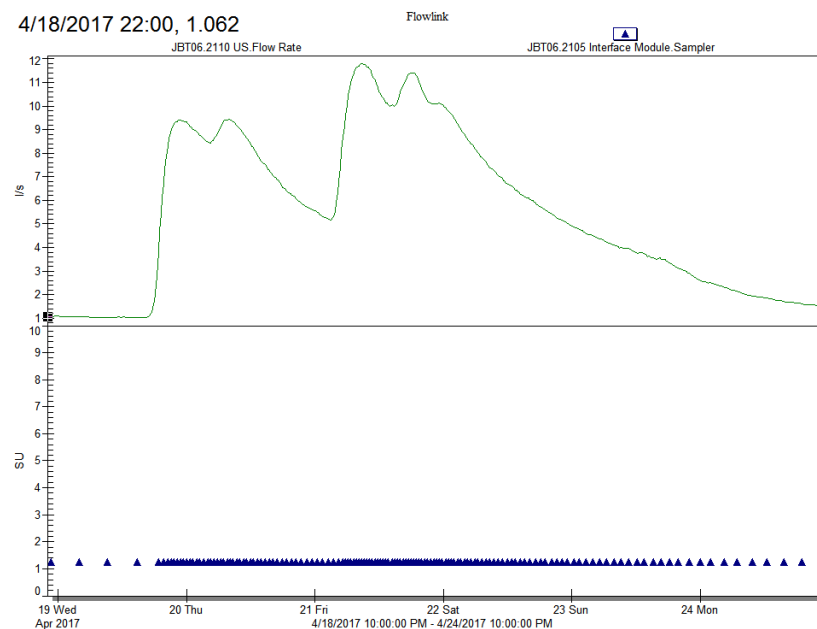


Figure 1. Example flow rate and sampling marks from Station JBT06

Flow monitoring and sample collection continues at all 12 stations. Flow-paced, composite samples are collected approximately weekly. Through November, 34 sampling rounds have been performed at the tile drain monitoring sites. Flow-pacing settings are adjusted at the start of each sampling round, based on recently measured flow rates and the weather forecast. The goal is to produce a composite sample that is representative of that week's flow conditions at each site and is of appropriate volume. Stone's subcontractor, the Friends of Northern Lake Champlain, is performing the majority of the sample processing. Regular maintenance activities include checking/changing instrument desiccant and removing vegetation shading solar panels.

Sampling activities remained generally successful through November. On October 11th, the autosamplers were reprogrammed with two-part programs, each program part having a unique flow pacing setting. This change was made to increase the likelihood of collecting representative, composite samples of sufficient volume, while

reducing the potential of oversampling and premature filling of the full set of carboys. Cold temperatures the week of November 14th froze all the composite samples. As of November 14th, automated composite sampling was suspended due to below freezing conditions. We are currently collecting grab samples at all stations once per week. Additionally, the monitoring manholes are being insulated to protect the flowmeters against damage.

Providing sufficient power to all stations has been challenging under late fall conditions. The orientation of solar panels has been adjusted and additional solar panels have been added at the three stations with poor solar exposure, JBT01, JBT02, and JBT04. At JBT02 and JBT04, the deep cycle batteries have needed to be replaced with fresh batteries. Additionally, solar panels at JBT02 were vandalized and need to be replaced.

Manure applications were observed on October 27th at JBT05 and JBT06 and on November 15th at JBT01 and JBT02.

Composite samples collected at the tile drain monitoring stations are analyzed by the Vermont Agriculture and Environmental Laboratory for concentrations of total phosphorus (TP), total dissolved phosphorus (TDP), and total nitrogen (TN). Beginning in August and continuing through October, sample splits were collected for TN analysis on alternate weeks rather than weekly. Table 2 presents these data for all analyses classified as Approved. Results are not yet available for samples collected since October 17th, 2017.

We are currently computing flow totals corresponding with each composite sampling period, and will use the interval flow and constituent concentration data to calculate nutrient loads.

Table 1: Start dates for monitoring activities at each station

Station	Start flow monitoring	Start autosampling
JBT01	3/23/17	4/5/17
JBT02	3/23/17	4/5/17
JBT04	4/3/17	4/5/17
JBT05	4/20/17	4/20/17
JBT06	4/5/17	4/5/17
JBT07	3/30/17	4/5/17
JBT11	4/5/17	4/5/17
JBT13	4/3/17	4/11/17
JBT14	4/5/17	4/5/17
JBT16	3/30/17	4/5/17
JBT18	4/22/17	4/22/17
JBT19	4/22/17	4/22/17

Table 2: TP, TDP, and TN concentrations in composite samples collected through Oct. 17, 2017

Station	Sampling date	Carboy	TP (µg/L)	TDP (µg/L)	TN (mg/L)
JBT01	4/11/2017	1	491	258	4.81
JBT01	4/18/2017	1	55.1	21.1	4.77
JBT01	4/25/2017	1	77.3	17.6	5.24
JBT01	5/2/2017	1	333	81.2	5.63
JBT01	5/9/2017	1	208	44.5	5.29
JBT01	5/9/2017	2+3	236	40.8	5.17
JBT01	5/16/2017	1	26.7	15.4	4.96
JBT01	5/23/2017	1	127	26.7	5.27
JBT01	5/30/2017	1	19.3	13	5.13
JBT01	6/7/2017	1	23.5	7.6	5.32
JBT01	6/13/2017	1	23.9	13.9	5.29
JBT01	6/22/2017	1	28.6	16.1	6.48
JBT01	6/27/2017	1	108	64.4	22.19
JBT01	6/27/2017	2	111	72.2	15.57
JBT01	6/27/2017	3	63.8	44.1	8.47
JBT01	7/5/2017	1	256	77.9	8.05
JBT01	7/5/2017	2+3	94.6	46.7	6.27
JBT01	7/11/2017	1+2	223	106	6.63
JBT01	7/18/2017	1	98	47.5	5.31
JBT01	7/26/2017	1	21.7	31.6	4.4
JBT01	8/1/2017	1	23.8	20.9	3.69
JBT01	8/8/2017	1	33.3	20.1	N.S. ^B
JBT01	8/22/2017	1	55.5	26.6	3.1
JBT01	9/5/2017	1	37	13.6	3.81
JBT01	9/12/2017	1	114.4	34	N.S. ^B
JBT01	9/19/2017	1	116.1	73	2.4
JBT01	9/26/2017	1	119	18.3	N.S. ^B
JBT01	10/3/2017	1	49.3	14.8	3.53
JBT01	10/10/2017	1	1250	45.3 ^C	N.S. ^B
JBT01	10/10/2017	2	1204	35 ^C	N.S. ^B
JBT01	10/10/2017	3+4	914	37.9 ^C	N.S. ^B
B: TN analyzed on alternate weeks; C: TDP filtered by VAEL one day after collection					

Station	Sampling date	Carboy	TP (µg/L)	TDP (µg/L)	TN (mg/L)
JBT02	4/11/2017	1	976	678	7.19
JBT02	4/18/2017	1	242	93.6	8.52
JBT02	4/25/2017	1	491	142	8.68
JBT02	5/2/2017	1	805	492	8.58
JBT02	5/9/2017	1	585	120	8.52
JBT02	5/9/2017	2	868	122	7.88
JBT02	5/9/2017	3	868	156	8
JBT02	5/16/2017	1	109	37.6	8.26
JBT02	5/30/2017	1	78.5	30.3	8.83
JBT02	6/7/2017	1	67.3	28.2	11.78
JBT02	6/13/2017	1	48	28.5	11.69
JBT02	6/22/2017	1	90.9	42.3	12.86
JBT02	6/26/2017	1	137	61.9	25.34
JBT02	6/26/2017	2	189	82.2	29.34
JBT02	6/26/2017	3	160	94	27.34
JBT02	6/26/2017	4	315	106	22.93
JBT02	7/5/2017	1+2	102	60.5	9.85
JBT02	7/11/2017	1	303	118	8.68
JBT02	7/11/2017	2	433.5	196	7.19
JBT02	7/18/2017	1	186.5	118	7.27
JBT02	7/26/2017	1	73.1	70.4	8.03
JBT02	8/1/2017	1	63.9	40	8.41
JBT02	8/8/2017	1	50.5	37	N.S. ^B
JBT02	8/15/2017	1	52	41.3	7.29
JBT02	8/22/2017	1	307.5	141	5.81
JBT02	8/30/2017	1	142.2	63.2	N.S. ^B
JBT02	9/5/2017	1	137	53.4	5.09
JBT02	9/12/2017	1	674	106	N.S. ^B
JBT02	9/19/2017	1	138.5	85.6	6.36
JBT02	9/26/2017	1	102.4	65.2	N.S. ^B
JBT02	10/3/2017	1	81.3	43.3	4.93
JBT02	10/10/2017	1	1464	69.7 ^C	N.S. ^B
JBT02	10/10/2017	2	1322	77.5 ^C	N.S. ^B
JBT02	10/10/2017	3+4	1202	91.7 ^C	N.S. ^B
JBT02	10/17/2017	1	252	86.7	9.22
B: TN analyzed on alternate weeks; C: TDP filtered by VAEL one day after collection					

Station	Sampling date	Carboy	TP (µg/L)	TDP (µg/L)	TN (mg/L)
JBT04	4/11/2017	1	798	120	4.89
JBT04	4/18/2017	1	115	38.6	4.33
JBT04	4/25/2017	1	133	45.4	4.86
JBT04	5/2/2017	1	500	79.2	5.43
JBT04	5/9/2017	1	303	52.9	4.19
JBT04	5/9/2017	2+3	404	58.8	4.23
JBT04	5/16/2017	1	68.8	22.2	3.8
JBT04	5/23/2017	1	109	23.6	4.35
JBT04	5/30/2017	1	90.2	18.1	4.37
JBT04	6/7/2017	1	114	10.7	5.65
JBT04	6/13/2017	1	42.9	19.6	5.19
JBT04	6/22/2017	1	108	49.5	5.39
JBT04	6/27/2017	1	184	52.4	29.19
JBT04	6/27/2017	2	135	49.6	27.59
JBT04	6/27/2017	3	115	65.3	16.71
JBT04	6/27/2017	4	73.6	50.1	11.85
JBT04	7/5/2017	1	270.5	53	13.07
JBT04	7/5/2017	2+3	132	52.6	7.29
JBT04	7/11/2017	1+2	261.5	51.5	8.25
JBT04	7/18/2017	1	125.5	38.4	5.79
JBT04	7/26/2017	1	39.5	50.4	4.36
JBT04	8/1/2017	1	30.5	24.1	3.81
JBT04	8/8/2017	1	35.2	20.6	N.S. ^B
JBT04	8/15/2017	1	29.8	22.6	2.92
JBT04	8/22/2017	1	465	228	5.89
JBT04	8/30/2017	1	71	23.5	N.S. ^B
JBT04	9/5/2017	1	152	21.5	3.19
JBT04	9/12/2017	1+2	698	32.4	N.S. ^B
JBT04	9/19/2017	1	64.8	22.5	1.29
JBT04	9/26/2017	1	67.6	32	N.S. ^B
JBT04	10/3/2017	1	78.3	31	1.05
JBT04	10/10/2017	1	500	33.5 ^C	N.S. ^B
JBT04	10/10/2017	2	256	34.7 ^C	N.S. ^B
JBT04	10/10/2017	3+4	244	39.3 ^C	N.S. ^B
JBT04	10/17/2017	1	102	23.9	1.38
B: TN analyzed on alternate weeks; C: TDP filtered by VAEL one day after collection					

Station	Sampling date	Carboy	TP (µg/L)	TDP (µg/L)	TN (mg/L)
JBT05	4/25/2017	1	68.7	53.7	24.78
JBT05	5/2/2017	1	226	108	20.6
JBT05	5/9/2017	1	132	82.9	23.56
JBT05	5/16/2017	1	33.6	26.6	21.68
JBT05	5/23/2017	1	60	38.4	14.84
JBT05	5/30/2017	1	38.4	37	10.52
JBT05	6/6/2017	1+2	34.1	21.4	8.1
JBT05	6/13/2017	1+2+3	67.6	49.6	12.68
JBT05	6/22/2017	1	61.2	40.6	14.48
JBT05	6/27/2017	1+2	345	285.3	34.73
JBT05	6/27/2017	3+4	408	357	27.73
JBT05	6/30/2017	1	79.7	57.2	24.83
JBT05	6/30/2017	2	595	452	21.23
JBT05	6/30/2017	3	210	181	23.63
JBT05	7/5/2017	1	134	100	24.58
JBT05	7/11/2017	1+2	565	493	23.7
JBT05	7/18/2017	1	138	104	29.55
JBT05	7/26/2017	1	51.5	85.8	23.8
JBT05	8/1/2017	1	42.8	37.6	21.61
JBT05	8/8/2017	1+2	46.6	51.1	N.S. ^B
JBT05	8/15/2017	1	32.2	26.1	10.63
JBT05	8/22/2017	1	124.8	44.4	15.31
JBT05	8/30/2017	1	91.1	28.6	N.S. ^B
JBT05	9/5/2017	1	204	51.3	10.41
JBT05	9/12/2017	1	133	67.6	N.S. ^B
JBT05	9/19/2017	1	65.2	30.6	11.76
JBT05	9/26/2017	1	39	22.3	N.S. ^B
JBT05	10/3/2017	1	43.7	22.4	7.82
JBT05	10/10/2017	1	966	383.2	18.54
JBT05	10/17/2017	1	167.0	122	12.63
B: TN analyzed on alternate weeks					

Station	Sampling date	Carboy	TP (µg/L)	TDP (µg/L)	TN (mg/L)
JBT06	4/11/2017	1	195	131	33.47
JBT06	4/18/2017	1	192	76.3	20.71
JBT06	4/25/2017	1	117	70.1	24.03
JBT06	5/2/2017	1	321	164	25.2
JBT06	5/9/2017	1	150	100	28.2
JBT06	5/9/2017	2	135	98.1	13.54
JBT06	5/16/2017	1	180	96.2	26.04
JBT06	5/23/2017	1	327	65.2	21.04
JBT06	5/30/2017	1	67.7	37.8	22.52
JBT06	6/7/2017	1	138	88.9	25.87
JBT06	6/13/2017	1	47.4	36.4	25.95
JBT06	6/22/2017	1	45.9	27.3	23.12
JBT06	6/27/2017	1	412	192	42.67
JBT06	6/27/2017	2	210	157	48.27
JBT06	6/27/2017	3	416	222	46.63
JBT06	6/27/2017	4	234	183	49.83
JBT06	6/30/2017	All4	266.4	174	33.83
JBT06	7/5/2017	1	134	109	34.82
JBT06	7/11/2017	1+2	228	137	26.5
JBT06	7/18/2017	1	128.4	106	32.55
JBT06	7/26/2017	1	39.1	90.2	27.4
JBT06	10/10/2017	1	393	171	N.S. ^B
B: TN analyzed on alternate weeks					

Station	Sampling date	Carboy	TP (µg/L)	TDP (µg/L)	TN (mg/L)
JBT07	4/11/2017	1	708	159	7.52
JBT07	4/18/2017	1	45	14.1	4.81
JBT07	4/25/2017	1	103	27.4	5.79
JBT07	5/2/2017	1	279.6	58	6.72
JBT07	5/9/2017	1	126	41.4	6.17
JBT07	5/9/2017	2+3	230	54.2	6.59
JBT07	5/16/2017	1	19.7	12.9	5.21
JBT07	5/23/2017	1	24.4	11.9	5.08
JBT07	5/30/2017	1	21.1	14.2	5.29
JBT07	6/7/2017	1	17	6.98	5.57
JBT07	6/13/2017	1	N.S. ^A	13.1	5.35
JBT07	6/22/2017	1	39.3	17.1	8.16
JBT07	6/26/2017	1	242	177	45.18
JBT07	6/26/2017	2	555	357	45.18
JBT07	6/26/2017	3	204	182	31.59
JBT07	6/26/2017	4	389.2	230	23.59
JBT07	6/30/2017	1	79.7	60.8	12.67
JBT07	6/30/2017	2+3	700	327	18.55
JBT07	7/5/2017	1	119	88.6	11.62
JBT07	7/11/2017	1	47.3	21	11.05
JBT07	7/18/2017	1	69.9	54.9	15.37
JBT07	7/26/2017	1	82.5	37.3	9.14
JBT07	8/1/2017	1	29.4	25.1	6.96
JBT07	8/22/2017	1	226	135.7	3.37
JBT07	8/30/2017	1	52	32.6	N.S. ^B
JBT07	9/12/2017	1	168.5	89.5	N.S. ^B
JBT07	9/12/2017	2+3	106	77.3	N.S. ^B
JBT07	9/19/2017	1	51.8	19.1	3.06
JBT07	9/26/2017	1	100.8	32.3	N.S. ^B
JBT07	10/10/2017	1	304	124.5	N.S. ^B
JBT07	10/17/2017	1	39.6	21.4	2.04
A: Broken at lab; B: TN analyzed on alternate weeks					

Station	Sampling date	Carboy	TP (µg/L)	TDP (µg/L)	TN (mg/L)
JBT11	4/11/2017	1	39.5	57.8	3.35
JBT11	4/18/2017	1	11.5	16.2	2.59
JBT11	4/25/2017	1	14.7	9.73	2.45
JBT11	5/2/2017	1	46.5	16.1	2.04
JBT11	5/9/2017	1	28.8	12	1.63
JBT11	5/9/2017	2	39	12.9	1.53
JBT11	5/16/2017	1	31.2	23.1	1.24
JBT11	5/23/2017	1	234	28.8	1.24
JBT11	5/30/2017	1	18.1	9.58	0.81
JBT11	6/7/2017	1	18.6	6.46	0.91
JBT11	6/13/2017	1	49.7	17.2	1.29
JBT11	6/22/2017	1	68.8	26.4	0.77
JBT11	6/27/2017	1	61.5	29.2	1.48
JBT11	6/27/2017	2	89.8	48	1.59
JBT11	6/27/2017	3	77.1	51.4	1.54
JBT11	6/27/2017	4	81.4	44	1.51
JBT11	6/30/2017	1	30.3	17.9	1.11
JBT11	6/30/2017	2	24.8	17.9	1.01
JBT11	6/30/2017	3	24	16.8	1.05
JBT11	6/30/2017	4	23.3	16	1.06
JBT11	7/5/2017	1	21.2	16.8	1.16
JBT11	7/11/2017	1	28.1	19.5	1.3
JBT11	7/18/2017	1	33.5	64.4	1.22
JBT11	7/26/2017	1	15.4	26	0.96
JBT11	8/1/2017	1	59.1	35.2	1.23
JBT11	9/5/2017	1	92.6	45.2	1.13
JBT11	9/12/2017	1+2	419.5	411	N.S. ^B
JBT11	9/19/2017	1	77.9	38.1	1.20
JBT11	9/26/2017	1	126.9	34.9	N.S. ^B
JBT11	10/3/2017	1	26	14.1	0.19
JBT11	10/11/2017	1	255.6	202.5	N.S. ^B
JBT11	10/17/2017	1	92.5	77.8	0.81
B: TN analyzed on alternate weeks					

Station	Sampling date	Carboy	TP (µg/L)	TDP (µg/L)	TN (mg/L)
JBT13	4/18/2017	1	63.8	23.2	6.12
JBT13	4/25/2017	1	113	26.1	6.44
JBT13	5/2/2017	1	560	41.1	5.25
JBT13	5/9/2017	1+2	120	35.7	6.1
JBT13	5/16/2017	1	35295	N.S. ^A	217.21
JBT13	5/23/2017	1	3720	2525	17.2
JBT13	5/30/2017	1	2975	2070	14.08
JBT13	6/7/2017	1	3585	2240	19.08
JBT13	6/13/2017	1	815	489.5	7.97
JBT13	6/22/2017	1	912	585	8.94
JBT13	6/27/2017	1	525	218	21.83
JBT13	6/27/2017	2	384.8	137	12.71
JBT13	7/5/2017	1	312	143	28.87
JBT13	7/5/2017	2	87.1	70.5	14.03
JBT13	7/11/2017	1	350.4	191	12.15
JBT13	7/18/2017	1	95.3	94.8	16.97
JBT13	7/26/2017	1	127	118	10.2
JBT13	8/8/2017	1	248	148	N.S. ^B
JBT13	8/15/2017	1	336	196	5.29
JBT13	8/22/2017	1	274.5	138.5	7.74
JBT13	8/30/2017	1	272	94.1	N.S. ^B
JBT13	9/5/2017	1	139	70.8	2.87
JBT13	9/12/2017	1+2	202	149	N.S. ^B
JBT13	9/19/2017	1	104.8	57.7	5.94
JBT13	9/26/2017	1	86.8	46.4	N.S. ^B
JBT13	10/3/2017	1	99.1	61.5	1.86
JBT13	10/11/2017	1	612	172 ^C	N.S. ^B
JBT13	10/17/2017	1	178	115	N.S. ^B
A: Broken at lab; B: TN analyzed on alternate weeks; C: TDP filtered by VAEL one day after collection					

Station	Sampling date	Carboy	TP (µg/L)	TDP (µg/L)	TN (mg/L)
JBT14	4/11/2017	1	248	66.5	7.43
JBT14	4/18/2017	1	70.5	33.2	8.25
JBT14	4/25/2017	1	145	51.5	7.62
JBT14	4/25/2017	2	46.3	35.2	8.22
JBT14	5/2/2017	1	342	59.3	7.2
JBT14	5/9/2017	1+2	177	51.1	7.12
JBT14	5/16/2017	1	4335	1640	51.21
JBT14	5/23/2017	1	690	183	9.66
JBT14	5/30/2017	1	78.2	75.7	7.72
JBT14	6/7/2017	1	138	143	19.95
JBT14	6/13/2017	1+2	73.6	60.1	9.89
JBT14	6/22/2017	1	189	132	11.88
JBT14	6/27/2017	1	482	208	31.95
JBT14	6/27/2017	2	618	345	22.75
JBT14	6/27/2017	3	246	216	19.91
JBT14	6/30/2017	1	436	210	56.87
JBT14	6/30/2017	2	220	162	34.23
JBT14	7/5/2017	1	95.9	86.4	16.81
JBT14	7/5/2017	2	90.4	74.1	14.07
JBT14	7/11/2017	1	103	87.4	13.35
JBT14	7/18/2017	1	88.3	102	14.87
JBT14	7/26/2017	1	69.4	79.3	12.9
JBT14	8/1/2017	1	59.7	73.6	11.8
JBT14	8/30/2017	1	350	238.5	N.S. ^B
JBT14	9/5/2017	1	309	251.4	4.97
JBT14	9/12/2017	1+2	162	107	N.S. ^B
JBT14	9/19/2017	1	52.9	26.1	7.84
JBT14	9/26/2017	1	37.5	29	N.S. ^B
JBT14	10/3/2017	1	82	67.7	4.95
JBT14	10/11/2017	1	776	150	N.S. ^B
JBT14	10/11/2017	2	481.5	206	N.S. ^B
JBT14	10/11/2017	3	340.5	184	N.S. ^B
JBT14	10/11/2017	4	133.8	91	N.S. ^B
JBT14	10/17/2017	1	67.3	49.5	N.S. ^B
B: TN analyzed on alternate weeks					

Station	Sampling date	Carboy	TP (µg/L)	TDP (µg/L)	TN (mg/L)
JBT16	4/11/2017	1	105	72.7	5.77
JBT16	4/18/2017	1	28.2	22.4	5.12
JBT16	4/25/2017	1	28.5	21.5	4.48
JBT16	5/2/2017	1	256.2	25.5	3.89
JBT16	5/9/2017	1+2	31.3	13.7	2.79
JBT16	5/16/2017	1	19.4	13.3	2.89
JBT16	5/23/2017	1	26.2	17	2.96
JBT16	5/30/2017	1	26.7	17.7	2.62
JBT16	6/7/2017	1	25.9	9.56	3.68
JBT16	6/13/2017	1	29.4	17.4	3.44
JBT16	6/22/2017	1	85.9	32.9	5.81
JBT16	6/26/2017	1+2	89.2	44.1	21.99
JBT16	7/5/2017	1	41	28.9	14.85
JBT16	7/5/2017	2+3	34.3	27.6	12.43
JBT16	7/11/2017	1	32.8	29.8	9.75
JBT16	7/18/2017	1	35.4	22.3	8.4
JBT16	7/26/2017	1	45.9	51.7	8.87
JBT16	8/1/2017	1	54.7	39.1	8.52
JBT16	8/15/2017	1	159	32.6	6.41
JBT16	8/22/2017	1	81.9	59.9	6.67
JBT16	8/30/2017	1	59.6	36.8	N.S. ^B
JBT16	9/12/2017	1+2	84.1	48.5	N.S. ^B
JBT16	9/19/2017	1	63.5	35.3	5.66
JBT16	10/10/2017	1	1025	630 ^C	N.S. ^B
JBT16	10/17/2017	1	169	133	7.09
B: TN analyzed on alternate weeks; C: TDP filtered by VAEL one day after collection					

Station	Sampling date	Carboy	TP (µg/L)	TDP (µg/L)	TN (mg/L)
JBT18	4/25/2017	1	87.4	46.1	1.16
JBT18	5/2/2017	1	170	42.3	1.26
JBT18	5/9/2017	1	140	40.1	1.13
JBT18	5/9/2017	2	77.5	37.5	0.99
JBT18	5/9/2017	3	159	32.5	1.06
JBT18	5/9/2017	4	199	38.6	1.1
JBT18	5/16/2017	1	80.8	35.9	0.71
JBT18	5/23/2017	1	49.7	16	0.78
JBT18	5/30/2017	1	89.1	23	0.95
JBT18	6/6/2017	1	46.5	8.59	0.79
JBT18	6/13/2017	1	160	31.1	1.25
JBT18	6/22/2017	1	71.2	N.S. ^A	1.33
JBT18	6/30/2017	1	260.5	57.2	2.04
JBT18	6/30/2017	2	234	71.5	1.9
JBT18	6/30/2017	3	206	58.9	1.61
JBT18	6/30/2017	4	142	57.9	1.38
JBT18	7/5/2017	1+2+3+4	143	74.4	0.98
JBT18	7/11/2017	1	135	59.5	1.06
JBT18	7/18/2017	1	166	183	1.15
JBT18	7/26/2017	1	66.5	40	1.1
JBT18	8/1/2017	1	43.3	28.2	0.83
JBT18	8/8/2017	1	34.5	16.1	N.S. ^B
JBT18	8/22/2017	1	75.9	33.1	2.18
JBT18	8/30/2017	1	46.2	26.6	N.S. ^B
JBT18	9/5/2017	1	75.9	28.3	3.15
JBT18	9/12/2017	1	185.8	113.5	N.S. ^B
JBT18	9/12/2017	2	117	71.2	N.S. ^B
JBT18	9/19/2017	1	64.6	26.9	0.84
JBT18	9/26/2017	1	180	28.6	N.S. ^B
JBT18	10/10/2017	1	223	80.9	N.S. ^B
JBT18	10/17/2017	1	195	47.9	1.58
A: Broken at lab; B: TN analyzed on alternate weeks					

Station	Sampling date	Carboy	TP (µg/L)	TDP (µg/L)	TN (mg/L)
JBT19	4/25/2017	1	27.2	31.7	1
JBT19	5/2/2017	1	56	21.1	1.1
JBT19	5/9/2017	1	40.1	29.1	0.76
JBT19	5/9/2017	2	20.9	12.2	0.61
JBT19	5/9/2017	3+4	55.2	20.4	0.82
JBT19	5/16/2017	1	17.6	12.6	0.45
JBT19	5/23/2017	1	54.6	22.1	1
JBT19	5/30/2017	1	21.8	10.4	0.49
JBT19	6/13/2017	1	81.1	23.1	0.91
JBT19	6/22/2017	1	151	N.S. ^A	1.24
JBT19	6/30/2017	1	163	73.7	2.04
JBT19	6/30/2017	2	52.2	39.4	0.88
JBT19	6/30/2017	3+4	51.8	40.9	0.94
JBT19	7/5/2017	1+2+3+4	41.4	31.3	0.71
JBT19	7/11/2017	1	45.3	21.8	0.57
JBT19	7/18/2017	1	79.3	74.2	1.05
JBT19	7/26/2017	1	29.3	27.5	0.73
JBT19	8/1/2017	1	32.8	18.7	0.58
JBT19	8/8/2017	1	111	22.6	N.S. ^B
JBT19	8/30/17	1	29.1	13.8	N.S. ^B
JBT19	9/5/2017	1	55.5	17.4	1.92
JBT19	9/12/2017	1+2	62.4	28.9	N.S. ^B
JBT19	9/19/2017	1	62.1	12.5	0.75
JBT19	10/17/2017	1	208.5	16.4	1.46
A: Broken at lab; B: TN analyzed on alternate weeks					

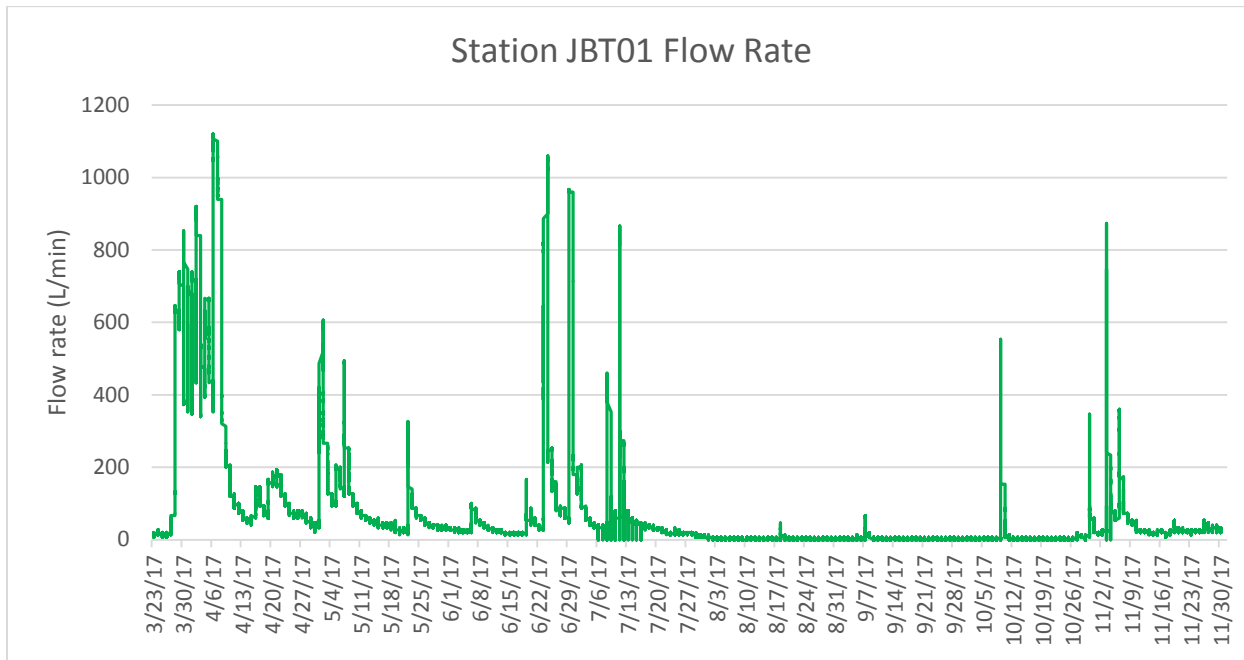


Figure 2. Flow rate at the JBT01 tile drain monitoring station